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pour la solution du même problème, puisqu'elle ne contient que le mouvement radial et ne dépend pas des distances des étoiles. Après des substitutions faciles elle prend la forme :

$$s' = s + x_0 \cos \alpha \cos \delta + y_0 \sin \alpha \cos \delta + z_0 \sin \delta, \qquad \text{(I)}$$

où

$$x_0 = m \cos \alpha_0 \cos \delta_0, \quad y_0 = m \sin \alpha_0 \cos \delta_0, \quad z_0 = m \sin \delta_0, \quad \text{et} \quad s' = n \cos \zeta \cos \theta.$$

s' n'est que la partie du mouvement radial due au mouvement réel de l'étoile, ou, ce qui revient au même, la projection de ce mouvement sur le rayon visuel.

En supposant, comme à l'ordinaire, que les mouvements particuliers des étoiles ont lieu indifféremment dans tous les sens possibles, je considère s' comme une erreur accidentelle qui doit disparaître des équations normales. Ensuite j'examine l'effet des erreurs constantes dans la détermination de α_0, δ_0 et m, et je fais séparément l'application du procédé aux séries numériques des mouvements radials trouvés à Greenwich et par Mr. Huggins. Les résultats ainsi obtenus sont, à mon avis, remarquables, malgré le petit nombre des étoiles employées, leur inégale répartition sur la sphère céleste, et l'existence possible d'erreurs systématiques dans les observations. Je ne crois pas, pourtant, que les anciennes méthodes doivent être abandonnées ; la comparaison de leurs résultats avec ceux que donne la méthode que j'ose proposer pouvant, peut-être, conduire à nous donner quelques renseignements sur le mouvement d'ensemble du système sidéral.

Observatoire de Madrid,
le 20 *Décembre* 1877.

On the Distribution of the Fixed Stars in Space.

By Sidney Waters, Esq.

In Mr. Proctor's Chart of all the stars in Argelander's maps, we have an accurate representation of the distribution of the stars of the northern heavens down to the ninth magnitude; but we have no illustration of a similar character for the southern heavens. There does not indeed as yet exist sufficient data for the construction of a chart to correspond to Mr. Proctor's; but I thought that it might be worth while, in the meantime, to utilise as far as possible the results of Sir John Herschel's star gauges given in his Cape of Good Hope observations.

I have therefore, in the chart now laid before the Society, represented on an equal surface projection these results in as accurate a manner as possible. The map was divided to 20 minutes in R.A. and 3° in P.D., and the results of the gauges were figured in their proper places, the areas of the spaces were

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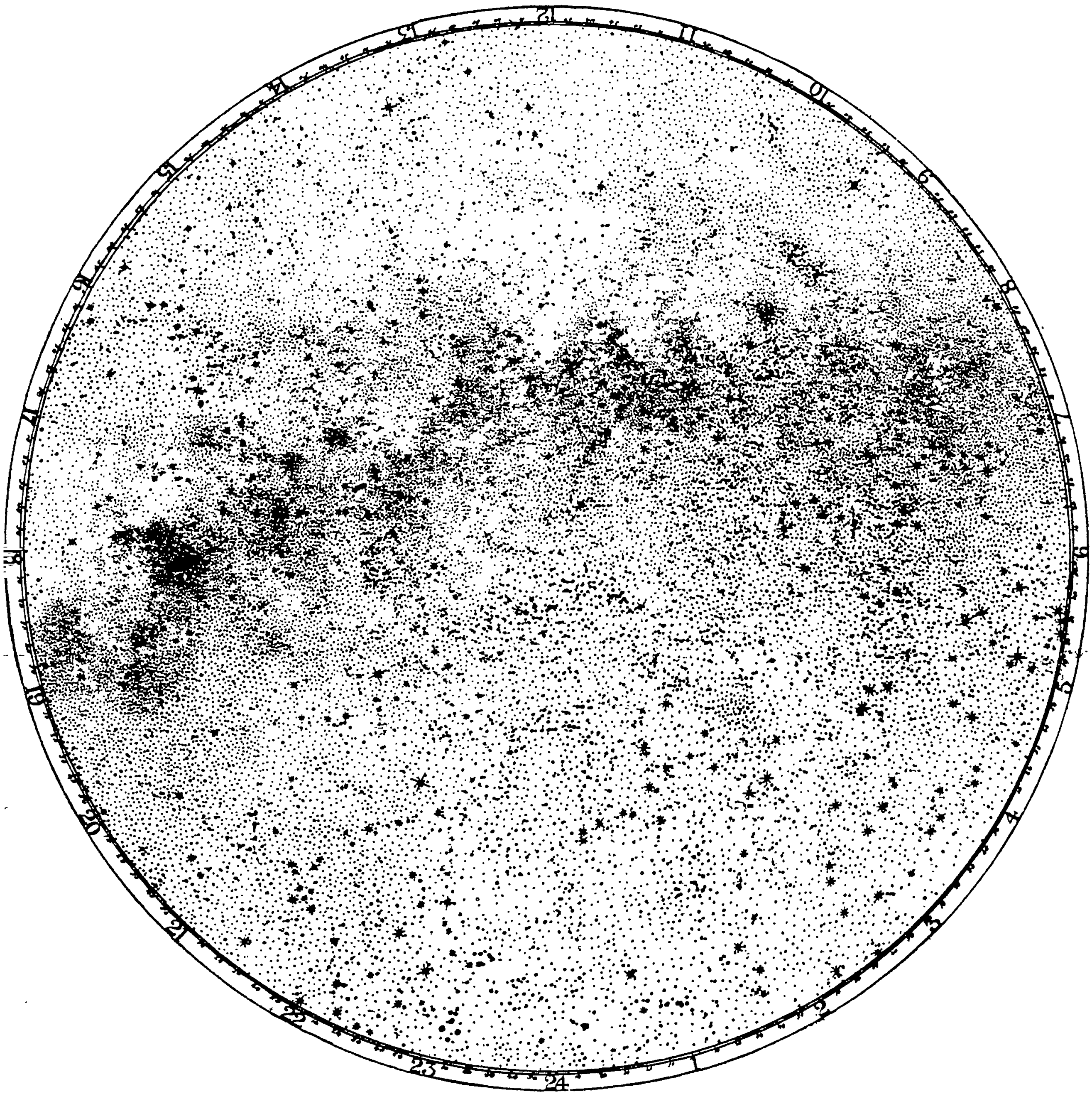

HERSCHEL'S STAR-GAUGES IN THE SOUTHERN HEAVENS
AND THE STARS VISIBLE TO THE NAKED EYE
Drawn on the Isographic Projection
BY SIDNEY WATERS F.R.A.S.

THE POSITIONS OF THE STARS VISIBLE TO THE NAKED EYE ARE FROM MR. PROCTOR'S CHART.

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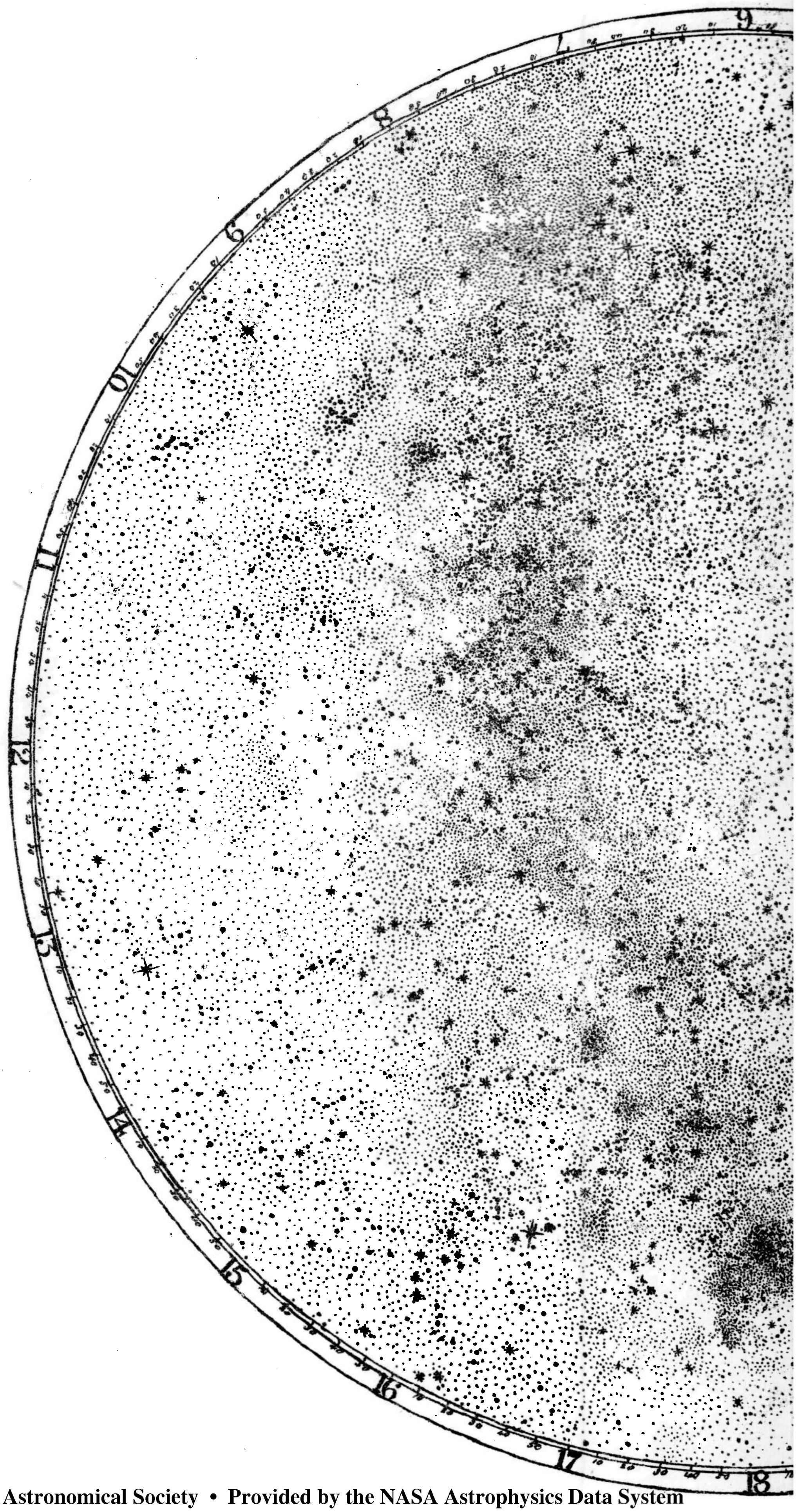

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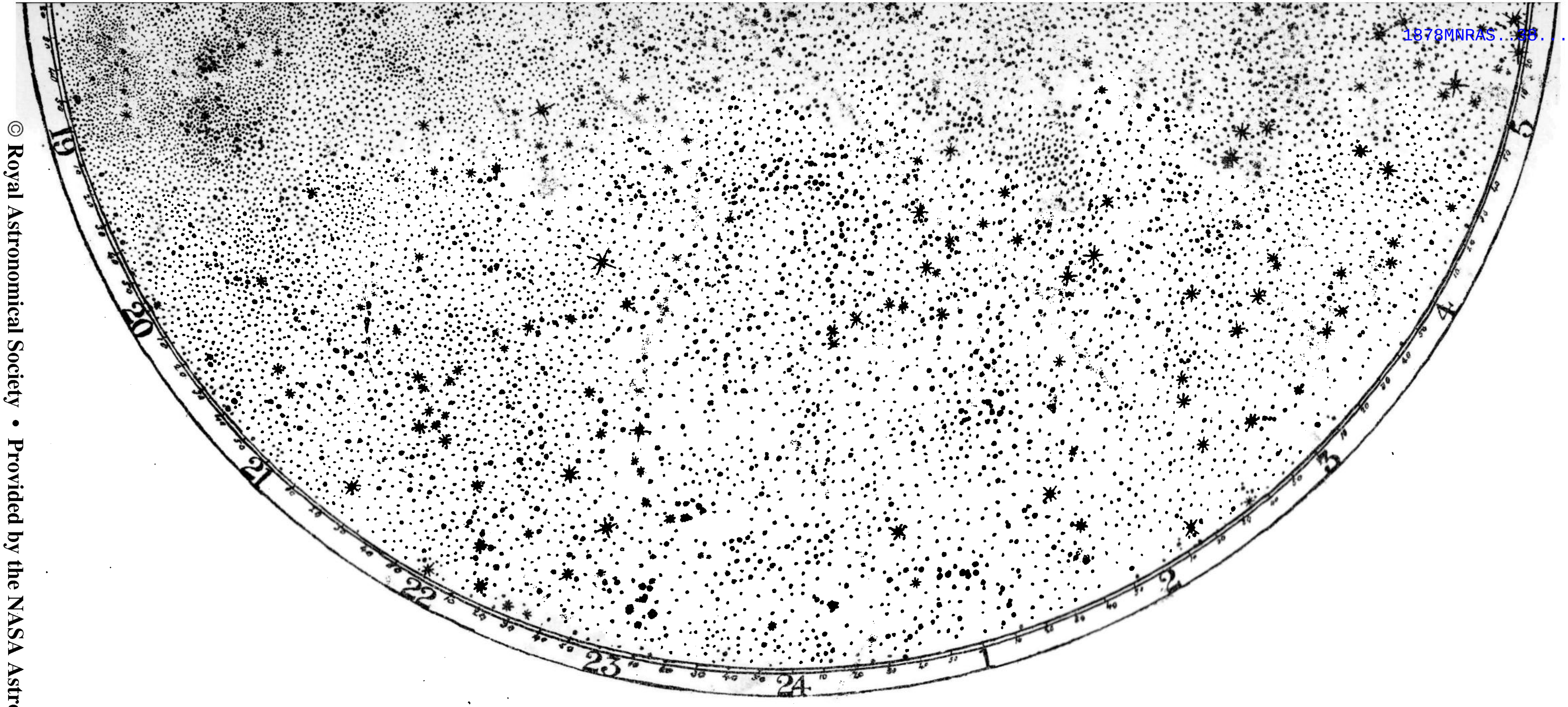

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calculated, and the average of the gauges falling on each space multiplied by its area, the result being dotted as nearly as possible equally over the space. Nearly all the spaces were covered in this way; but in those cases where no gauges fell the average of the surrounding spaces was taken. It will be understood that the number of stars marked in the map is very small in comparison with the number which actually exist, but they represent with fair accuracy the state of distribution over the southern heavens down to the faintest stars visible in Sir John Herschel's 18¼-inch Reflector. The stars visible to the naked eye were afterwards added.

The teaching of the chart does not confirm the results of Mr. Stone's investigations published in the *Monthly Notices* of last March. The great massing of stars in parts of the Milky Way, its complicated form, and the sudden decrease of stars at its borders are facts not consistent with the view that we are merely looking through an immense depth of stars, or that distance is the principal reason of their faintness. It is not denied that brightness is an important factor in the determination of stellar distances; but the point contended for is, that it is not a sufficient basis upon which to found any theory of the construction of the heavens.

With regard to the list of star parallaxes which Mr. Stone gives, he states that "we have here a proved range of stellar distance in at least the proportion of 1 to 10." The weight of this illustration will be properly estimated when it is remembered that both the first and the last on the list (*α Centauri* and *Capella*) are stars of the first magnitude, and that therefore it may with equal force be said that we have a proved range of dimension in at least the same proportion. Again, with regard to Mr. Stone's comparison of Argelander's numbers with the numbers computed on the assumption that the stars are distributed with an approximate uniformity in space, there is an excess in the observed number of ninth magnitude stars of 40,000 over the requirements of the theory, the numbers being 142,000 and 102,780. But it is necessary to take into account the fact that Argelander's number is considerably below the truth, owing to the omissions which inevitably occur in counting faint stars. The discrepancy will therefore have to be considerably increased. Notwithstanding this, Mr. Stone considers that it may be altogether disregarded. I do not think that it will be so readily conceded that a difference of at least one-third of the number involved may be disposed of so lightly.

The points, therefore, that I have to urge are, that the fainter stars increase at a far greater rate than would be the case if Mr. Stone's view were correct, and that the theory that the stars are distributed with any uniformity, either as to space or dimension, is not in accordance with the teaching of the chart which I now beg to lay before the Society.